Response to Comments for the Draft Groundwater Sampling WP-QAPP for the Upland OU
Comments received February 3 and 4, 2022; USACE response to comments on March 3, 2022
Bradford Island Cascade Locks, Oregon

Number	Comment	USACE Response
Oregon DEQ		
1.	**Section 1.2.1, Objectives, Landfill GW Sampling** The work plan states that the 2017 Feasibility Study (FS) will be replaced by a new revised FS. Because there was agreement within the Technical Advisory Group (TAG) that complete removal of landfill material (Alternative L5) will be the proposed remedial option, further characterization work on groundwater and other migration pathways was generally thought to be unnecessary. The recommendation for complete landfill removal was based on known variability in landfill material, the large number of samples that would be needed to characterize such a heterogenous environment, and the significant risk of mass wasting to the Columbia River given the instability of the landfill. Some of the statements in the scoping portion of the work plan could imply that migration pathways for groundwater and seep water may be considered acceptable, despite the known data limitations and contaminant heterogeneity. To avoid any misunderstandings, and to provide context, include a statement regarding TAG agreement that complete removal is recommended for the landfill. Because the highest contamination levels were measured in water from seeps, not groundwater, DEQ would prefer that seeps be sampled along with monitoring wells. The Optimization Report also recognized the importance of seeps at the landfill. If seeps are not sampled now, they can be sampled after the removal of the landfill.	The primary intent of this sampling effort is to ensure groundwater concentrations are reasonably consistent with (or lower than) concentrations from the RI, as anticipated and compared to the results from the most recent groundwater sampling efforts from 2008 and 2009. Per the Optimization Study, this one-time confirmational sampling is to update groundwater analytical data that is over 10 years old. The updated groundwater data will be used to confirm or revise the CSM as necessary. The proposed sampling effort can also confirm that no groundwater-specific remedial action is warranted in the Upland OU, prior to removal of source materials from the landfill and sandblast area. As stated previously, USACE concurs that complete removal of the Landfill AOPC would provide a higher level of protection and long-term risk reduction compared to other remedial action alternatives. Seeps are not planned as part of this effort or prior to finalization of the Revised Feasibility Study. However, seep sampling would be warranted during baseline sampling prior to and/or after construction of the Upland OU remedies and subject to subsequent groundwater monitoring.
2.	**Section 1.3, Data Quality Objectives** One objective is to determine that analytes previously not detected in groundwater remain un-detected. Therefore, the analyte list should be comprehensive and not limited to those detected historically. DEQ previously made this comment using BTEX as an example. To assist with review of screening level values (SLVs), DEQ requests a spreadsheet table of SLVs and their sources, with an indication of the lowest value. The lowest SLV should then be compared to the LOQs, LODs, and DLs in Table 5. As an example for making comparisons with data, Table 5-1d in the RI report shows selected SLVs, and indicates the source of the screening value. This type of explicit presentation of the lowest SLVs helps with the evaluation of data. Response to comment #3 states that site specific SLVs will not be used. However, DEQ ecological risk assessment guidance Table 2 is cited as a source of SLVs. Risk-based concentrations for inorganics in this table have already been adjusted. Please confirm that DEQ updated ecological water SLVs will be used. Performance criteria should be incorporated from the Remedial Investigation QAPP. Table 9 has measurement performance criteria for water (groundwater, seep, and surface water). Any differences between proposed performance criteria and what was specified in the RI should be clearly identified. This will help in evaluating data to determine if differences in results are due to actual changes in concentrations or differences in performance criteria. For a site proposed for NPL listing, it is especially important to carefully follow the RI QAPP to ensure confidence in the useability of any new data.	The objectives are to compare historical concentrations to current concentrations (DQO-1) and compare analytical concentrations to current SLVs (DQO-2). DQO-2 is intended to in part address potential data gaps, by including additional analytes that may not have been sampled historically or by including analytes that had detection limits above historical SLVs. Neither objective is to determine that analytes previously not detected remain undetected. There are at least 4 quarters of data for every monitoring well between 2008-2009. For the landfill there is additionally groundwater data going back to 1999. Those sampling events are decades after the releases to each AOPC occurred. On December 8, 2021, USACE provided an excel spreadsheet with all of the historical groundwater analytical results, and a step-wise process for evaluating additional potential data gaps. This comparison to screen in additional analytes was done after already including a wide range of contaminants based on the factors listed in step 3 of the DQO table in the QAPP. The comparison included considering all historical analytes for inclusion based on detections or ND's with MDL's above the selected SLVs used during the RI. The sources of each SLV chosen for the RI weren't explicitly stated on that spreadsheet provided, but they were the lowest SLVs from the hierarchy of sources listed in the RI. Table 5 of the current groundwater QAPP has been updated to show 1) the SLVs from the RI (and their sources) for those select analytes where a comparison to the SLVs was used as part of whether to include those analytes or not, and 2) the current SLVs for all analytes. The primary purpose of the study is to confirm if concentrations are consistent with historical concentrations. While additional data gaps are also being looked for, the intent is not to redo the risk assessment. There are some instances where the 2022 SLVs were not technically achievable. Where detection limits do exceed 2022 SLVS, the SLVs have been footnoted on Table 5 of the Revised QAPP, so this can be taken into consideration for evaluating the results. As part of the objective of finding potential data gaps with additional analytes, groundwater results will be compared to the most conservative of the current (non-site specific) SLVs from the sources listed in the RI to determine if there any exceedances. Any SLV exceedances will be evaluated to determine if the current CSM should be updated and whether groundwater should be further evaluated in the FS. As stated in the QAPP, "Performance criteria for the analytical methods are specified in the laboratory procedures and are compliant with DoD QSM 5.3". Appendix B has been added to include both laboratory measurement performance criteria and accreditations.

3.	**Table 5 and Data Reporting:** The response to comment indicates that the detection limit and limit of quantitation will be reported. Clarify the use, if any, of the limit of detection.	LOQ, LOD, and DL are DoD-specific terminology. Nondetect values are assigned the numerical value of the LOD. The Limit of Detection (LOD) is defined as the lowest concentration for reliable reporting of a non-detect of a specific analyte in a specific matrix with a specific method at 99% confidence. At the LOD, the false negative rate (Type II error) is 1%. In other words, if a sample has a true concentration at the LOD, there is at least a 99% probability of reporting a "detection" (a measured value ≥ DL) and a 1% chance of falsely reporting a nondetect (a false negative). The Detection Limit (DL) is the smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration with 99% confidence. At the DL, the false positive rate (Type I error) is 1% (red shaded region in Figure 1). A DL may be used as the lowest concentration for reliably reporting a detection of a specific analyte in a specific matrix with a specific method with 99% confidence. A fact sheet defining the LOQ, LOD, and DL can be found at the DoD DENIX EDQW website: https://denix.osd.mil/edqw/documents/documents/revised-detection-and-quantitation-fact-sheet-october-2017/
4.	**Presence of NAPL/Sheen:** Include in the work plan a procedure for documenting the presence of odor, sheen, and non-aqueous phase liquid (NAPL) that may be found in the monitoring wells. Previous boring logs indicated the presence of petroleum odor and sheen. These observations should be added to tables of results and maps.	Concur. Text was added to section 2.1.2 and 2.1.6 noting the need to document any odor, sheen, and/or NAPL.
5.	**TPH:** The response to comments does not specifically address the silica gel / sulfuric acid cleanup in the NW-TPH-Dx analysis. Clarify that samples will be analyzed without this cleanup process. Analysis with and without cleanup is an option. In Table 5, NWTPH-Dx is shown as Diesel Range Organics (DRO) and Residual Range Organic (RRO) which are terms defined and used by the Washington Department of Ecology. DEQ sums these two ranges into a single Total Petroleum Hydrocarbon Diesel Extended Range (TPH-Dx) value for screening human health and ecological risks. As an option, Oregon allows further refinement of TPH composition and associated toxicity by volatile petroleum hydrocarbon (VPH) and extractable petroleum hydrocarbon (EPH) analysis.	Part 1: "Total Petroleum Hydrocarbons analysis should not include silica gel or other cleanup that would remove polar metabolites from the sample" was added to the Table 5 notes. Part 2: Comment noted.
6.	**Section 2.1.1, Groundwater Sampling:** Typically, one sampling event is not sufficient to characterize or confirm groundwater concentrations. Concentrations can vary with seasons and fluctuating water levels. For this reason, groundwater is generally sampled on a quarterly basis to characterize contaminant ranges and trends in concentrations DEQ recommends four quarters of groundwater sampling. The hydrographs and concentration data for the landfill area show iron and manganese concentrations, and their mobility in groundwater, are affected by seasonal changes in water elevations.	Four subsequent quarters of groundwater monitoring was previously conducted during 2008 and 2009 in support of the Remedial Investigation. The intent of this monitoring event is not to redo previous RI sampling, but to supplement the findings given the extended period of time since the last sampling effort was performed. The previous quarterly sampling data provides a good indication of the concentration fluctuations seen seasonally in the Bradford Island monitoring wells, which is presented on the hydrographs and discussed further in the QAPP. The season chosen for sampling appears to have an insignificant role on determining the presence and magnitude of contaminants present in each well. Sampling during this winter period is suitable to inform the project of current groundwater concentrations prior to selection and finalization of remedial actions.
7.	**Section 5.3, Data Verification and Validation Qualifiers**: This section should specify how EMPCs will be reported for PCB congeners.	A note has been added "Estimated maximum possible concentration (EMPC-qualified) values will be treated as detected concentrations and flagged by the laboratory. EMPC-qualification is used when mass spectrometry results meet all of the identification criteria in the method except the ion abundance ratio criteria. The results will be flagged J+ by the validator, to indicate that the reported concentration is detected and may be associated with a possible bias."
Yakama Nation		
Carlton Environmental (on behalf of Yakama Nation)		
1.	It is appreciated that the draft WP-QAPP includes analysis for the full suite of metals, TPH-RRO, and 4-methylphenol.	Comment noted.

2.	Seep Sampling – Per YNF Comment 6 submitted January 5, 2022: "*Although USACE stated during the December 3, 2021 Ad Hoc meeting that they weren't planning on sampling groundwater seep samples during this upcoming event due to their belief that any contaminants found in the seeps would dilute out significantly upon entering the river – we disagree. These seep-driven contaminants entering the river may not impact aquatic organisms with a broad foraging range; however, there are many aquatic organisms that are relatively stationary in which most of their life-spans are spent adjacent to these seeps/discharge points. While we understand that seep sampling may not take place during this upcoming event, we ask that USACE, at a minimum, include all analytes that could adversely impact aquatic organisms in their SLV evaluation in determining their analyte list for the groundwater sampling.*" USACE's response refers to the selected SLVs used in the 2012 RI and indicates that the proposed analyte list for this groundwater WP-QAPP includes analytes that exceeded SLVs. It is unclear which SLVs that USACE is referring to (2012 SLVs or updated SLVs) in their comment response. Please provide clarification.	Seep sampling is not planned as part of this effort or prior to finalization of the Revised Feasibility Study. However, seep sampling would be warranted during baseline sampling prior to and/or after construction of the Upland OU remedies and subject to subsequent monitoring. The proposed analyte list is based on comparison to 2012 SLVs. Evaluation of future groundwater data will be evaluated against updated SLVs.
3.	Groundwater Data Gaps within Pistol Range AOPC and Former Hazardous Materials Storage Area (HMSA) – Per YNF Comment 7 submitted January 5, 2022: "*When asked about including the installation of groundwater monitoring wells in the Pistol Range AOPC during the December 3, 2021 Ad Hoc meeting, USACE responded that there were no SLV exceedances for two groundwater samples collected in this area. Given that the SLVs need to be updated and exceedances re-evaluated, we ask that USACE consider collecting groundwater in this area for the full suite of analytes. For example, based on ODEQ's updated freshwater chronic RBC for lead (0.54 µg/L), the two historical groundwater samples from the Pistol Range AOPC exceed this RBC by a factor of 19 and 23 for PR-01 and PR-02D, respectively.*" USACE's response stating that all contaminants of interest were already analyzed in groundwater and were found to be below SLVs appears to be incorrect. USACE's response ignores the importance of comparing historical data with updated SLVs, which in this case indicate clear exceedances for lead. Furthermore, USACE has not addressed the possibility of potential contaminant transport from the former HMSA via groundwater discharges to the Pistol Range AOPC. The former HMSA did not have secondary containment or protective berms and in addition to storing various hazardous and non-hazardous materials, may have been used to store sandblast grit. Soils within this area were found to have high concentrations of metals, HPAHs, bis(2-ethylhexyl)phthalate, and dibenzofuran; yet no groundwater data were collected within this area. **Recommendation –** USACE use this opportunity to fill the groundwater data gaps identified in the Pistol Range AOPC and the former HMSA for the full suite of analytes. This data would be very useful in updating the conceptual site model with respect to both the Sandblast AOPC as well as the Pistol Range AOPC.	The proposed analyte list is based on comparison to 2012 SLVs. Evaluation of future groundwater data will be evaluated against updated SLVs. Lead is being analyzed for at the request of external technical reviewers. Per the Remedial Investigation, groundwater samples were collected from two temporary borings in the Pistol Range AOPC in 2009 and analyzed for the predominant analytes impacting soil in the area – copper, lead, nickel, and zinc. No concentrations of these analytes exceeded the 2012 SLVs. USACE still believes there is sufficient information for the Pistol Range to move forward with the alternative analysis in the Revised Upland FS, and ultimately plans to propose excavation of the source soil. The Remedial Investigation concluded there have been limited releases of contaminants in the vicinity of the former HMSA. Based on previous soil data for the former HMSA, USACE does not suspect that this area serves as a significant source of contamination to groundwater.
4.	Table 4 (Data Quality Objectives), Step 6 includes an out-of-date reference for the Department of Defense Quality Systems Manual (DoD QSM). Please update all DoD QSM references to the most up-to-date version (5.4 released in October 2021), as applicable.	This text was changed to "Department of Defense Quality Systems Manual (DoD QSM) 5.4 (or laboratory-accredited version)". Laboratories have two years to become accredited to a new QSM version.
5.	Table 5 (Sample Methods, Analytes of Interest, and Detection and Reporting Limits) indicates that both PCB Aroclors and congeners will be analyzed; however, only PCB congeners are identified for analysis throughout the remaining text and tables. **Recommendation –** Update text and tables for consistency, as appropriate. At a minimum, PCB congeners should remain throughout the text; however, if USACE is proposing to also analyze for PCB Aroclors, additional information associated with this analytical method will need to be added throughout the text and tables.	PCB Aroclors have been deleted from Table 5. Only congeners will be analyzed.
6.	Table 5 (Sample Methods, Analytes of Interest, and Detection and Reporting Limits) is missing SLVs. Per previous YNF comments, in order to meet DQO-1 and DQO-2 of the QAPP, this table must include the lowest applicable SLVs that need to be met for each analyte. In addition, the sensitivity of the analytical methods will need to be evaluated	Table 5 of the current groundwater QAPP has been updated to show 1) the SLVs from the RI (and their sources) for those select analytes where a comparison to the SLVs was used as part of whether to include those analytes or not, and 2) the current SLVs for all analytes. The primary purpose of the study is to confirm

	to ensure that the analytical method chosen is sensitive enough to measure below the SLVs. It is likely that more sensitive analytical methods will be needed (e.g., high-resolution GC/MS methods may be required for limits of detection/reporting to meet SLVs for pesticides and possibly other compounds).	if concentrations are consistent with historical concentrations. While additional data gaps are also being looked for, the intent is not to redo the risk assessment. There are some instances where the 2022 SLVs were not technically achievable. Where detection limits do exceed 2022 SLVS, the SLVs have been footnoted on Table 5 of the Revised QAPP, so this can be taken into consideration for evaluating the results.
7.	Table 10 (Methods, Sample Containers, Quantities, Volumes, Preservation, and Holding Times for Groundwater Samples) is missing information for TPH-RRO, which needs to be added.	This information has been added; TPH-DRO and TPH-RRO are analyzed from the same sample.
8.	Section 5 (Data Review, Verification, and Validation) should specify how data qualified or flagged as an "estimated maximum possible concentration" (EMPC) will be treated. **Recommendation –** Since this data will not undergo a Stage 4 full validation effort, all data qualified/identified as an EMPC by the analytical laboratory should be considered a detected value at the reported concentration with an assigned "J+" qualifier by the validator, to indicate that the reported concentration is detected and may be associated with a positive bias.	A note has been added to section 5.3: "Estimated maximum possible concentration (EMPC-qualified) values will be treated as detected concentrations and flagged by the laboratory. EMPC-qualification is used when mass spectrometry results meet all of the identification criteria in the method except the ion abundance ratio criteria. The results will be flagged J+ by the validator, to indicate that the reported concentration is detected and may be associated with a possible bias."
Farallon Consulting (on behalf of Yakama Nation)		
1.	**Establish the Upland Operable Unit remedial action objective (RAO) for source control prior to sampling.** Collection and evaluation of groundwater data should be consistent with achieving the Upland Operable Unit RAOs. USACE is in the process of developing an additional RAO to address source control in the Upland Operable Unit that is protective of the River Operable Unit and has scheduled ad hoc meetings for March 2022. The proposed sampling will inform future remediation in the Upland Operable Unit by evaluating current groundwater conditions at Bradford Island and whether historical 2012 Remedial Investigation1 data remains representative. *Recommendation: Complete development of the Upland Operable Unit RAOs prior to finalizing the Work Plan and scheduling proposed sampling.*	The intent of this sampling effort is to address the DQOs presented in Table 4 of the QAPP related to obtaining current groundwater data. DQO-1 consists of comparing historical to current groundwater concentrations and DQO-2 consists of filling potential data gaps and providing context for current groundwater concentrations relative to current risk-based thresholds. USACE believes these DQOs will adequately inform the subsequent analysis that will result from establishing a RAO for source control. It is not necessary to develop an RAO before sampling. It is common for studies progressing through the RI and FS phases to have data collection prior to RAO development. USACE plans to engage external technical reviewers in early March to begin development on a source control RAO.
2.	**Screening levels should be updated to reflect current regulatory requirements.** Both YNF and Oregon Department of Environmental Quality (Oregon DEQ) previously requested screening level values (SLVs) that will be used for comparison to analytical results should be reviewed and updated. Additionally, Work Plan data quality objective 2 (DQO-2) states: *Compare current analytical concentrations for contaminants in groundwater at the Site to current SLVs for human health and ecological risk. Include analytes of interest that may not have been consistently sampled historically to fill potential data gaps. (Emphasis added.)* USACE has responded to previous comments from both YNF and Oregon DEQ that reviewing and updating SLVs for Bradford Island are not necessary. However, even a cursory review of the SLVs presented in the 2012 Remedial Investigation suggests these revisions are both relevant and appropriate. Attached Table J-1 provides a summary of 2012 Remedial Investigation groundwater direct contact SLVs compared with current values for each criteria that was considered. The Table J-1 demonstrates the applicable criteria for many analytes and the resulting SLV have been updated to be more conservative than the original values used in 2012. *Recommendation: Review and update SLVs for all media to reflect current regulatory requirements, including applicable state criteria.*	Table 5 of the current groundwater QAPP has been updated to show 1) the SLVs from the RI (and their sources) for those select analytes where a comparison to the SLVs was used as part of whether to include those analytes or not, and 2) the current SLVs for all analytes. The primary purpose of the study is to confirm if concentrations are consistent with historical concentrations. While additional data gaps are also being looked for, the intent is not to redo the risk assessment. There are some instances where the 2022 SLVs were not technically achievable. Where detection limits do exceed 2022 SLVS, the SLVs have been footnoted on Table 5 of the Revised QAPP, so this can be taken into consideration for evaluating the results.
3.	**Confirm selected analytical methods can achieve limits of quantitation (LOQ) that are less than or equal to current applicable SLVs.** With the establishment of the additional Upland Operable Unit RAO and completion of appropriate updates to SLVs, the Work Plan should present in a clear human-readable table each analyte, applicable SLV, and the limit of	Table 5 of the current groundwater QAPP has been updated to show 1) the SLVs from the RI (and their sources) for those select analytes where a comparison to the SLVs was used as part of whether to include those analytes or not, and 2) the current SLVs for all analytes. The primary purpose of the study is to confirm if concentrations are consistent with historical concentrations. While additional data gaps are also being looked for, the intent is not to redo the risk assessment. There are some instances where the 2022 SLVs were

	detection and limit of quantitation for the selected analytical method. This is a routine and necessary requirement to demonstrate the proposed sampling approach will yield data that can be used to evaluate the site against applicable criteria; will meet the data quality objectives (DQOs); and will ultimately support a cleanup that will meet the identified RAOs. Preliminary analysis by Farallon, presented in Table J-1, indicates that default limits of quantitation for several analytes will exceed applicable SLVs. Therefore, without corrective action at this stage, data collected under the Work Plan will not meet the stated project DQOs (Table J-1). This preliminary review indicates that special arrangements with the selected analytical lab will be necessary for many analytes to yield data with the appropriate level of analytical precision. However, the Work Plan does not offer substantive details regarding what measures, if any, will be taken to ensure appropriate limits of quantitation will be achieved. *Recommendation: Per the comments above, establish the applicable RAO and update screening levels for the site, then perform the complete analysis. Update the Work Plan to specify how the proposed analytical methods will meet DQOs and provide usable analytical results with an appropriate limit of quantitation for direct comparison to SLVs.*	not technically achievable. Where detection limits do exceed 2022 SLVS, the SLVs have been footnoted on Table 5 of the Revised QAPP, so this can be taken into consideration for evaluating the results.
4.	**Confirm monitoring well construction details and perform sampling on a quarterly basis for at least one year.** The range of reported groundwater elevations previously observed in the monitoring wells on Bradford Island indicate groundwater elevations fluctuate by approximately 3 to 7 feet (Work Plan Table 8). Historical data presented in the 2012 Remedial Investigation indicate that groundwater elevations have historically fluctuated by as much as 10 feet. The range of elevations is sufficient to warrant quarterly monitoring for a period of at least one year -- two would be preferable -- to ensure sampling results are representative of subsurface conditions and individual results are not anomalous. *Recommendation: Correct Table 8 footnote #3, which selectively focuses on a subset of available groundwater monitoring data. Update the Work Plan to perform quarterly groundwater monitoring over a period of at least one year capturing conditions in all four primary seasons and the full range of Columbia River stages. Provide monitoring well construction details including surveyed coordinates, top of casing elevations, and the reference datum2 for all elevations reported.*	Four subsequent quarters of groundwater monitoring was previously conducted during 2008 and 2009 in support of the Remedial Investigation. The intent of this monitoring event is not to redo previous RI sampling, but to supplement the findings given the extended period of time since the last sampling effort was performed. The previous quarterly sampling data provides a good indication of the concentration fluctuations seen seasonally in the Bradford Island monitoring wells, which is presented on the hydrographs and discussed further in the QAPP. The season chosen for sampling appears to have an insignificant role on determining the presence and magnitude of contaminants present in each well. Sampling during this winter period is suitable to inform the project of current groundwater concentrations prior to selection and finalization of remedial actions. There is one very large discrepancy in groundwater elevation (for MW-1) and footnote 3 in Table 8 calls attention to that discrepancy and discusses it's relation to historical trends.
5.	**Analyze groundwater for standard full-list analytes for each analytical method.** The Work Plan has limited the analytes selected for analysis on the basis of previous Remedial Investigation analyses and/or detections. This rationale is incorrect and does not satisfy the recommendation of the Optimization Report which, as previously noted in YNF comments: *The optimization team recommends the existing groundwater monitoring wells be sampled to assess current conditions (water quality and water levels). It is recommended that analysis include the complete target analyte list for metals to avoid issues with only sampling for a subset of metals that might be of concern. Analysis should also include pesticides, [volatile organic compounds], [polycyclic aromatic hydrocarbons] (full scan), butyltin, [polychlorinated biphenyls], and both diesel and gasoline-range hydrocarbons.* Eliminating select analytes from each analytical group, while adding effort in the preparatory phase, does not provide a complete assessment of current conditions as intended in the Optimization Report recommendation. Limiting the list of proposed analytes is also inconsistent with Work Plan DQO-2 (see above) which specifically includes "analytes that may not have been sampled for historically to fill potential data gaps." The rationale that USACE has presented that some analytes were eliminated on the basis they were previously reported non-detect or	USACE used the recommendation from the Optimization Study and eliminated a select number of analytes based on previous data collected during the RI if historic detections of analytes were consistently found below risk-based thresholds. This process was presented to external technical reviewers and an Excel workbook illustrating the screening process, along with a proposed analyte list, was provided via email on December 8, 2021. A five-week review period was provided for feedback on the analyte list. USACE added specific analytes at the request of external technical reviewers, including the full suite of metals, TPH, and 4-methylphenol.

	at concentrations less than SLVs does not make sense given both that the SLVs are out of date, and the purpose of the sampling is – literally – to evaluate whether the historical data remains representative. *Recommendation: include full analyte lists for chemicals of potential concern as previously identified by YNF and Oregon DEQ including volatile organic compounds, polycyclic aromatic hydrocarbons, target analyte list metals.*	
6.	**Include groundwater discharge at seeps in synoptic sampling.** Development of the additional RAO for the Upland Operable Unit is intended to address pathways from the Upland Operable Unit to the River Operable Unit. Synoptic groundwater sampling combined with sampling of groundwater seep discharge will provide a more comprehensive and informative data set than groundwater sampling alone. Seep sampling was previously performed as part of the 2012 Remedial Investigation; evaluation of whether this data remains representative is warranted and will further inform the need to evaluate this exposure pathway. *Recommendation: include groundwater discharge sampling at riverbank seeps in the scope of work.*	Seep sampling is not planned as part of this effort or prior to finalization of the Revised Feasibility Study. However, seep sampling would be warranted during baseline sampling prior to and/or after construction of the Upland OU remedies and subject to subsequent monitoring.
7.	**Confirm analytical laboratories are accredited for the selected analytical methods in Oregon.** All analyses performed in the Upland Operable Unit should be performed by an analytical laboratory that holds current accreditation both form the EPA Superfund Contract Laboratory Program and the State of Oregon. *Recommendation: Include current laboratory accreditations demonstrating compliance with both the EPA Superfund Contract Laboratory Program and Oregon DEQ requirements as an appendix to the Work Plan.*	The applicable laboratory accreditation program for DoD projects is the DoD Environmental Laboratory Accreditation Program (ELAP). It is a unified DoD program through which laboratories demonstrate competency and document conformance to the international standard ISO/IEC 17025:2005, General Requirements for the Competence of Testing and Calibration Laboratories as implemented by the DoD Quality Systems Manual for Environmental Laboratories (DoD QSM). The contract laboratory holds DoD ELAP accreditation for all methods except for those where an exemption was justified by the USACE project team according to technical needs, for example, the PCB congeners method is not a DoD-ELAP accredited method due to the analytes and reporting and detection limits required for the project. Laboratory accreditations were added to Appendix B.
U.S. EPA		
1.	This memo provides comments from the U.S. EPA on the Draft Workplan and Quality Assurance Project Plan (QAPP) for Groundwater sampling at the Bradford Island Site. Overall, the document does a good job of describing the sampling work to be performed. However, it appears to be missing several important components of a Quality Assurance Project Plan. We will send a recent example of a groundwater sampling QAPP from another project in EPA Region 10 and current EPA's QAPP guidance along with these comments.	For the Bradford Island project, USACE has maintained a Quality Assurance Project Plan format used over the course of the project in order to ensure consistency and readability for the outside technical experts from different groups engaged in the project. This format is not in the UFP-QAPP Worksheet format but does include the significant information of the sampling event. Specific items are discussed in response to EPA Comment #19. USACE will discuss using the UFP-QAPP Worksheet format for future sampling events with external technical reviewers including EPA.
2.	**Table of Contents, Table 10**. This table's title should be holding times for *Groundwater* (not soil) Samples. The table name on page 28 is correct, this is just a typo in the table of contents.	Typo corrected.
3.	**List of Acronyms.** Typo. GC-MS should be gas chromatography - mass spectrometry.	Typo corrected.
4.	**List of Acronyms**. This list includes JHA - Job Hazard Analysis, but elsewhere the document uses the term AHA - Activity Hazard Analysis.	Inconsistency corrected to only use AHA throughout the document.
5.	**List of Acronyms**. PHOSP is used in Table 2 but not defined in the Acronym List.	Acronym added.
6.	**Table 3, Analytical Labs and Contacts, page 4**. This is just an observation, not a comment. We note that some samples will be shipped to Illinois. It is important for cooler packing procedures and hold times to be aware of this. For example, the sampling crew may want to use more ice in the coolers headed to Illinois, confirm the lab will be able to receive samples that arrive over the weekend, etc. Will samples heading to Tacoma be shipped or hand-delivered?	Comment noted. USACE has contracted with EMT for analytical services on other projects and activities for the Bradford Island project. USACE has previous experience shipping samples to Illinois without encountering issues that compromise sample integrity. USACE field staff ensure all samples have sufficient ice and packaging to prevent breakage of sample containers. USACE coordinates with laboratory staff prior to any shipment expected for weekend delivery. Samples going to Tacoma will be shipped overnight. The SOP for sample packaging and shipping has been added as Appendix G to the QAPP.

7.	**Section 1.2.2, Landfill History, page 6.** Is there any reason to suspect the presence of Per-and Polyfluoroalkyl Substances (PFAS), such as debris from burn pits, fire fighting foams, or building materials with water / stain resistant coatings? If yes, we may need to sample for PFAS compounds in this or a future sampling event.	USACE will evaluate the potential for PFAS use on site and will respond to EPA once we have additional information.
8.	**Section 1.2.2, Landfill History, page 6**. This comment is beyond the scope of the groundwater sampling effort, but a new survey to map seeps may be warranted before the Landfill AOPC is remediated.	If seep sampling is warranted as part of baseline sampling prior to remediation, new seep surveys can be considered. Multiple rounds of seep surveys, including by boat and during different times of year, were completed prior to completion of the RI, which can be looked at further first.
9.	**Section 1.4, Secondary Data Evaluation, page 19**. Temperature, specific conductivity, DO, ORP, and turbidity will be measured and recorded during well purging. It would be helpful to state that here or elsewhere in the QAPP text.	Concur. Text added to section 1.4 stating these parameters will be collected during well purging.
10.	**Table 4, DQOs, page 12**. Should we add DQO-3, Confirm the direction of groundwater flow is consistent with the CSM? Or do we have enough data from previous (and reasonably recent) investigations to be confident in the direction of groundwater flow?	Sufficient data is available from the 2008-2009 quarterly sampling events to be confident in the direction of groundwater flow (N at the Landfill and NNW at the Sandblast Area). However, we do plan to collect groundwater elevation measurements from all monitoring wells on the first day of sampling, prior to purging or disturbing the groundwater elevation in any way. That data can be used to generate an updated potentiometric map to determine groundwater elevation.
11.	**Table 5, Analytes, Page 16.** Typo; p-cresol is misspelled (4-methylphenol).	Typo corrected.
12.	**Section 2.1.1, Well Redevelopment, page 21.** Some additional details / definitions for the well redevelopment event would be helpful: • How will excessive sedimentation be defined – an accumulation of 3 inches or more of sediment? Sediment that blocks more than 10 percent of the well screen depth? • What percent change in the recharge rate will determine that well redevelopment is required? • During the purge and recharge rate, will the wells be pumped dry? The field crew will need to use their judgment in assessing the overall condition of the well and the appropriate redevelopment measures, but clearer guidelines will help ensure consistency between wells and minimize confusion and debate in the field.	• Sediment that blocks more than 20% of the well screen (USEPA. 1988. Operations and Maintenance Inspection Guide. Office of Waste Program Enforcement) • Specific capacity can be calculated by dividing the purge rate by the drawdown over a set period of time, for both the January 2009 measurements and the new measurements to be collected. A decrease in specific capacity greater than 25% would be the indication used that the well needs to be redeveloped. Note - further evaluation of the January 2009 recharge data (data most representative of the seasonal groundwater conditions) determined that there was largely minimal/inadequate drawdown during that sampling event in order to have a recharge rate for comparison. Comparison of the most appropriate recharge rates of specific capacities was therefore not possible. The field team proceeded directly with well redevelopment of all monitoring wells during the week of February 7, 2022, instead of completing the evaluation steps to determine if it was not necessary at any wells. • It was noted in the purge and recharge rate step in the QAPP that the wells may be pumped dry. Note – during the completion of the well redevelopment activities, wells were pumped dry well when possible (some could not be due to strong recharge).
13.	**Section 2.1.1, Well Redevelopment, page 22**. What size Qwater Well Developer Tool will be used? Are all the well casings the same diameter, or will you need different sizes of the tool? Is there a backup plan in case the tool doesn't work or is damaged in the first well?	There were four Qwater Well Developer tools; two were for schedule 40 casing wells (MW's 6-15) and two were for schedule 80 casing wells (MW's 1-5). The second for each well casing size was a backup. The tools worked well and did not get damaged.
14.	**Section 2.1.2, Sample Collection Procedures, page 25.** Please check for the presence of NAPL and petroleum odors before sampling each well (and add a space for these observations on the field forms).	Concur. Text was added to sections 2.1.2 and 2.1.6 noting the need to document any odor, sheen, and/or NAPL.
15.	**Section 2.1.2, Sample Containers, page 27**. Some text to describe filling the bottles would be helpful here. For example, you may want to specify that bottles won't be opened until the well is purged and you are ready to begin collecting samples, that bottles will be filled directly from the tubing attached to the pump, etc. If there are multiple sample bottles and it is important to fill them in a particular order, the order should be specified. If both filtered and unfiltered samples will be collected, that should be explained.	Concur. Additional details added where needed, including sample collection order. Some of the detail is already included in the Low Flow SOP (Appendix D of QAPP).
16.	**Section 2.1.6, Field Documentation Procedures, page 29.** does not mention photos. Please specify what if any photos are required. Please do take some photos, especially of the well redevelopment – we will be curious to see the condition of water recovered from the wells.	Concur. Text was added section 2.1.6 noting photos will be collected during well redevelopment and sampling.
17.	**Section 2.3.1.3, page 31, Field Blanks**. Specify the source of DI water. This is not critical for the QAPP, but please ensure the source of DI water used in the field and the source of water used to decontaminate equipment between wells is recorded in the field logs or other project records.	Concur. Text was added to section 2.3.1.3 to note the sources of DI water for rinsate samples, which will be supplied by EMT Laboratories. Section 2.1.3 notes that water for the tap water rinse as part of the decontamination of equipment will be sourced from an on-site potable water faucet located in the Service Building.

18.	**Section 5.1, Review of Laboratory Data, page 34.** Data validation to Stage 2A should be supplemented with State 4 validation for 10% of the samples. In addition to increasing overall confidence in the data, this will ensure that the labs provide the full data packages, not just the results, and that a chemist reviews a portion of the raw data rather than relying solely on electronic data review.	Stage 4 data validation has been added for 10% of the samples.
19.	**Section 5.1, Review of Laboratory Data, page 35**. The text here uses the words Accuracy, Precision and Completeness, but does not define project-specific objectives. What is the acceptable window for analytical accuracy (percent recovery)? How will precision be calculated from duplicate samples? Is the goal for completeness 80 percent? 90 percent? It is important to define these things now, so we don't end up arguing later whether the data are sufficient to support site management decisions. Perhaps the QAPP for a previous investigation is still relevant and being followed for this sampling event. If that is the case, this document should point the reader to that QAPP. If not, there are critical elements of a QAPP missing from this document that need to be developed prior to the sampling event. At a minimum, this QAPP should include a table showing the screening levels to which the data from this event will be compared, and clear definitions of acceptable analytical accuracy, precision, and completeness. A QAPP should describe precisely how the data will be used and it should clearly demonstrate, in a step-wise fashion, that the data will be of sufficient quality to answer the questions identified in the DQO table.	It appears this comment relates to Section 5.4, as that is the section where the words "accuracy, precision and completeness" are present. Edits have been made to that section and are also addressed in the bullet points that answer specific parts of the associated comment in order. • The acceptable window for analytical accuracy (percent recovery) is defined in the DoD QSM for many analyses, and if not defined there, the laboratory's method limits are used. This was added to section 5.4.1. • The definition of precision and the relative percent difference calculation have been added to section 5.4.2. • The completeness goal for this sampling event is 95%, and this was added to section 5.4.3. • Screening levels are defined in DQO Step 5. The current SLVs that the data will be compared to have been added to Table 5.